



UNI01

IV BAG IN-LINE CCI TEST SYSTEM



CERT# 2197-01,2197-02
TYPE: CAL., TEST

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Section 1 Introduction

ATC IV Bag In-Line CCI Test Machine is used for automatic Container Closure Integrity (CCI) test of Unipharma IV bags.

The IV Bag CCI test measurement method is based on mass extraction technology. At deeper vacuum, liquid will boil off the surface and become gas vapor. The Intelligent Molecular Flow Sensor (IMFS) will measure the amount of gas extracted from the IV Bag, while the IV bag is placed inside a sealed vacuum chamber. The leak flow rate is then compared to the maximum allowed leakage, which is the flow rate generated from a known defect size at similar test conditions and a pass/fail decision is made.

The CCIT machine is configured to test 100mL IV Bags. However the machine is capable of testing four sizes of bags: 100, 150, 200 and 250 ml.

Note:

The IV Bag surface must be dry prior to the test.

The system includes the following subsystems:

- Metering conveyor to feed the parts to Gantry 1;
- Gantry 1 picks parts from metering conveyor and places them on one of two index conveyors;
- Two index conveyors; one for stations 1-6 and the other for stations 7-12;
- Gantry 2 will place 6 tested parts on the transit conveyor after being leak tested. Then picks 6 parts from indexing conveyor and place them into the leak test chambers for testing.
- Transit conveyor, transfers tested IV Bags to the customer supplied "Discharge" conveyor. During the transfer process, all parts will be rotated 90°, failed parts will be rejected by pusher and passed parts will continue to customer supplied conveyor.
- 12 Mass Extraction leak test stations, Model ME3s with their vacuum generation and control packages with vacuum chambers.
- Main PLC control Cabinet and Human Machine Interface (HMI) – AB Panel View Touchscreen.
- Changeover fillers for 100, 150, 200 and 250 ml bags – any changeover does not require tools and it is designed to be performed by the operator.

The Machine performs leak tests based on micro flow technology using ATC's Intelligent Gas Leak System (IGLS) for fast and accurate leak rate measurement.

An Allen-Bradley PLC interfaces with the IGLS to control the machine. The PLC controls operation of the gantries, the chamber clamping, and test initialization. An Allen-Bradley HMI interfaces with the operator to setup the machine, test parts, and perform maintenance troubleshooting.

ATC's Leak-Tek software package allows the operator to view individual test signatures and adjust the test parameters.

NOTE: Operating manuals for the IGLS and the Leak-Tek software are included in the machine manual.

WARNING: Failure to follow all setup and operating instructions in this manual may result in personal injury or damage to the machine.

WARNING: Failure to present IV bags with dry external surface will results in false rejection.

DANGER: Do not operate machine without all guarding in place and secured. Failure to do so can expose personnel to the gantry and other moving equipment resulting in possible injury or death.

Section 2 System Verification

System verification should be performed periodically to ensure that the leak test system is operating as intended.

2.1 Leak Test Verification

The frequency of the leak test verification is dependent on the end user, but it is common to perform system verification once per shift.

The verification procedure is a manual operation. The Verification sequence can be launched from the Automatic Screen on the HMI. Refer to section 4.4 to turn on partial power to the machine to perform the Verify Sequence of operations. The HMI contains the detailed instructions for performing the procedure with prompted messages.

A Side Verify Sequence

1. Machine Fully Stopped

2. Select Chamber to be verified

3. Install Orifice and Master Part in chamber Selected, Click "YES START"

4. PLC Closes Chamber

5. PLC Starts Test

6. Exhaust Chamber

7. Verify Test 1 Results

8. Uninstall the Orifice and Reinstall the plug, Click "YES START"

9. PLC Starts Second Test

10. Verify Test 2 Results

11. Exhaust Chamber and Open

12. Remove Master Part, Click "YES" to finish

Buttons: Home, System Not Home, YES START, YES START, YES, Start Over, Verification Abort, B Side Verification, Back to Automatic

Figure 2-1 HMI Screen Interface with verify sequence

If the verification test fails, supervisor or maintenance intervention is required to address failure of mastering sequence.

NOTE: *Refer to verification orifice calibration sheet for specific values.*

NOTE: *No daily or part change calibration is required for the IGLS. The purpose of the verification process is to verify total system integrity and proper operation.*

Section 3 Machine Operation

3.1 General Description

IV Bag In-Line CCI Test System includes 12 Model ME3 leak test instruments.

An Allen-Bradley HMI is provided for operator interface and will display messages on the screen when testing is in progress.

3.2 Sequence of Operation

The machine consists of 2 gantries, 12 chambers and 12 ME3 instruments.

The following sequence occurs when the machine is running in **Automatic Run Mode** ("☺" means that the step requires operations of operator and "☒" means that the step is finished by machine itself).

- ☒ When ATC CCI Test System is ready to load new IV Bags, ATC's PLC will send an output to the prior station (X-Ray machine). If this signal is not on, the feeding station should stop.
- ☺ Operator press start machine on HMI.

Load Sequence:

- ☒ PLC senses that IV bag has arrived from the X-Ray machine.
 - ☒ Metering conveyor places the bag under Gantry 1
 - ☒ Gantry picks IV Bag using vacuum cups and places it on indexing conveyor A
 - ☒ The indexing conveyor A indexes one position after bag is placed and repeats above steps until 6 IV Bag are prepared.
 - ☒ Next 6 IV bags are placed on the indexing conveyor B, in the same sequence.
- Note: Load sequence includes parallel motions to keep the pace with the machine cycle.

Test Sequence:

- ☒ Conveyor A is loaded with 6 untested IV Bags while conveyor B is being loaded with next 6 IV Bags.
- ☒ Gantry 2 picks 6 untested IV Bags from indexing conveyor A and places them into test chambers 1-6. The process is repeated on indexing conveyor B and test chambers 7-12 respectively.
- ☒ Chamber lids close and Leak Testing is performed.
- ☒ upon completion of the leak test, the chamber lid is opened.

Unload Sequence:

- ☒ Gantry 2 picks the 6 tested IV Bags (each tested on its own ME3 instrument) and places them on the transit conveyor.
- ☒ The part is rotated 90° as the transfer conveyor indexes. Pass part is transferred to the customer supplied Discharge conveyor and Fail part is pushed into reject bin. All untested parts drop into the untested parts bin located at the end of Indexing conveyors A and B.

NOTE: The machine will not perform corresponding task in any of chambers unless the IV Bag is present.

3.3 Main Screen



Figure 3-1 Main Screen Interface

The Main screen is the interface for the operator to navigate between screens. Information such as name of software and version is included in the Main screen.

Manual button, which leads to Manual screen, will be accessible while Maintenance logs in. System button leads to System screen. Part Select leads to Part Selection Screen. System screen can be accessible while Engineer logs in.

The Incrementing Counter in this screen can also be used as a troubleshooting tool for HMI and PLC communication. The incrementing counter located on the top right of the screen will stop ticking if the communication between HMI and PLC has been lost.

Buttons on the main screen are as follows:

Commands	Description
Login	Login
Automatic	Automatic Run
Logout	Logout
Manual	I/O Maintenance
System	Timings & System Settings

3.4 Automatic Screen

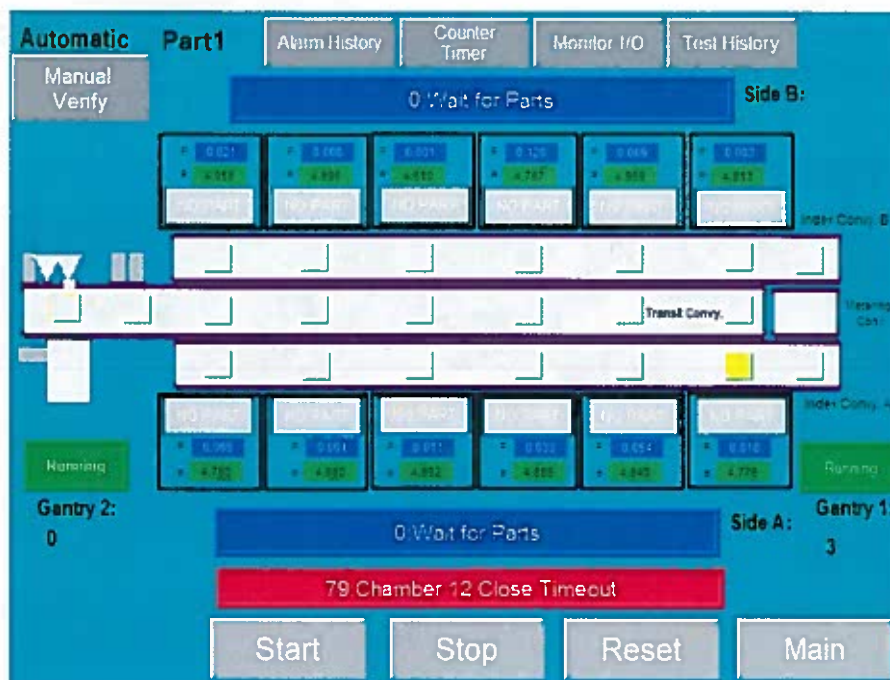


Figure 3-2 Automatic Screen Interface

The operator can choose to view different information while performing a test by touching the "Alarm History", "Counter Timer", "Monitor I/O", or "Test History" buttons in the screen.

IGLS Flow and Pressure readings can be viewed in Monitoring I/O Screen.

NOTE: If the IGLS is connected to the ATC Leak-Tek software, the PLC cannot display or record the IGLS flow and pressure readings.

Part Status is displayed beside Index conveyors. It displays as follows:

- Untested
- Pass
- Fail
- Testing
- Aborted
- Verf O Pass (test passes when orifice is open during verification)
- Verf O Fail (test fails when orifice is open during verification)
- Verf C Pass (test passes when orifice is close during verification)
- Verf C Fail (test fails when orifice is close during verification)
- No Part

Following table provides functions of Buttons.

Table 3-1 Buttons in the Automatic Screen

Button Name	Button Function & Descriptions
Start Machine Button (in HMI Panel)	Start Machine button will start in feed conveyor and all other corresponding operations.
Stop Machine Button (in HMI Panel)	Stop Machine button will let chambers finish the current task, unload parts from all chambers, and let gantry to go to home position. (The machine stops after current cycle.)
Clear Fault	Clear Fault button is displayed when a fault exists. Clicking Clear Fault will allow machine to clear fault for that station, raise chamber, abort gantry operation and move gantry to home. Operator is required to press Start Machine button to start sequence.
Gantry1 Home	Reset gantry1 and move it to home position.
Gantry2 Home	Reset gantry2 and move it to home position.
Part Selection	Select a different leak test setup for a different part.
Manual Verification	Leads to Machine Verify Sequence Screen. Follow the instructions on the screen to verify each chamber.
Counter/Timer	Enters the Counter/Timer screen.
Monitor I/O	Enters the Monitor I/O screen.
Test History	Enters the Test data history screen. It will display up to 100 data records.
Alarm History	Enter the HMI to alarm history screen.
Main	Exit the Automatic screen.

NOTE: The machine does not allow starting the task unless the IV Bag is present and chamber is closed.

Status Message bars along with error message bars are displayed in the Main selection for each station.

NOTE: When a fault occurs, the error message bar displays the error message with red background under the status bar. If no fault exists, the message bar is not visible.

The fault code is made up of 2 parts: fault number and fault description. A comprehensive table of all 100+ fault codes and possible root causes as well as recommended actions can be found in appendix A. The fault codes are broken down by subsystem, Table 3-1 is a sample of some of the station fault codes that may be generated. After locating the fault in the tables found in appendix A, a list of potential root causes as well as recommended corrective actions are provided.

Table 3-1 Station Fault Codes and Troubleshooting

Fault Code	Fault Description	Possible Cause(s)	Recommended Action
0	E-Stop	Power on input is not ON.	Check E-Stop
1	Low Pressure	System pressure is not ON.	Check system air supply; Check regulator pressure.

Table 3-1 Station Fault Codes and Troubleshooting			
Fault Code	Fault Description	Possible Cause(s)	Recommended Action
2	IGLS Type Timeout	Unable to select test type	Check Model ME3 remote I/O wiring to PLC; Check Model ME3 configuration.
3	IGLS Start Timeout	Unable to confirm that the test started	Check Model ME3 remote I/O wiring to PLC; Check Model ME3 configuration.
4	IGLS Test Timeout	Test did not finish within required time	Check Model ME3 remote I/O wiring to PLC; Check Model ME3 configuration; Check System screen timeout value for pressure leak test.

Table 3-2 lists the different Automatic screens and the information displayed on each respectively.

Table 3-2 Automatic Screen display and information	
Figure No.	Information Displayed
Figure 3-3	Alarm History information.
Figure 3-4	Total pouch number, Shift Total Pouches, Shift Good Pouches, Shift NG Pouches, Reset Shift button (this will reset the shift Pouches, shift good Pouches and shift NG Pouches to "0"). Other machine timer information is also provided.
Figure 3-5	Digital input and output information
Figure 3-6	Test Result related information. It stores 200 data records. It includes Pass/Fail, Flow Value and Pressure Value.
Figure 3-7	Part type selection for different ME3 test type



Figure 3-3 Automatic Screen Interface with Alarm Information

Counter & Timer						
STA1 Shift Total	Good	No Good	STA2 Shift Total	Good	No Good	
2356	2237	119	2924	2444	480	
STA3 Shift Total	Good	No Good	STA4 Shift Total	Good	No Good	
2922	2506	416	3302	2405	513	
STA5 Shift Total	Good	No Good	STA6 Shift Total	Good	No Good	
2976	2483	493	3193	2554	386	
STA7 Shift Total	Good	No Good	STA8 Shift Total	Good	No Good	
2809	2283	326	2617	2308	309	
STA9 Shift Total	Good	No Good	STA10 Shift Total	Good	No Good	
2352	1803	749	2614	2301	313	
STA11 Shift Total	Good	No Good	STA12 Shift Total	Good	No Good	
2608	2312	296	2593	2299	294	
Unload Time	Side A (s)	Side B (s)	Total Parts	Shift Total	Shift Good	Shift NG
43	51		32429	27735	4694	
Load Time	62	425				
Cycle Time	125	476				

Figure 3-4 Automatic Screen Interface with Counter/Timer information



Part Selection

Test Type	Part Numbers
TType1	OQPart1
TType2	OQPart2
TType3	OQPart2
TType4	OQPart2

TEST TYPE 1

Main

Figure 3-7 Automatic Screen Interface with part type selection

Section 4 System Configuration and Manual Control

4.1 System Related Settings



Figure 4-1 System Configuration Screen for time information

The main System screen is shown in Figure 4-1.

The System screen is protected by a Level-2 password. Only the Engineer has the authority to access this screen.

The System screen allows setting of parameters that affect machine and test operation.

- The Main button will exit this screen.
- Shutdown button will shut down the HMI to initial setting stage. HMI configuration setting can be set/reset at this stage.
- Chamber Enable/Bypass button allows enable/bypass of the corresponding chamber.

The System screen allows setting of parameters that affect machine and test operation.

Table 4.1 System Setting

Name	Default Setting (unit = 0.1 Sec)	Description
IGLS Start Delay	10	Test Start Delay
Leak Test Timeout	200	Determines the time allowed before fault occurs during a leak test. The PLC must receive a pass or fail result from the leak test instrument before this time runs out. This should be set to a minimum of 110% of the longest leak test cycle time. If the leak test instrument does not complete its test cycle within this time, a fault occurs.
Verify Wait time	150	The waiting period between two leak tests for verification mode.
Exhaust Time	10	The time to exhaust chamber.
Lid Lower/Raise Timeout	80	Timeout fault will occur if close/open lid time frame is out of this range.

WARNING: The password in Panel will be overwritten any time a new version of the runtime file is downloaded to the Panel from PC.

4.2 Manual Control

The Manual control screens are used for when performing machine diagnostics and also when clearing the system after a fault or part jam.

4.2.1 Manual I/O (Station 1-6) and (Station 7-12)

Individual chamber control is divided into two screens representing stations 1-6 (side A) and stations 7-12 (side B), as seen in Figures 4-2 and 4-3 respectively. The box around each station name contains information as well as controls for that particular station.

- The ME3 Start and ME3 Stop buttons can be used to manually initiate a test on that particular station. The chamber closed sensor must be triggered in order to start a test.
- The ME3 TType button is used to toggle between test types for that particular station.
- The Pass, Fail, PFail and FailR boxes are indicators which show the most recent test result for that particular station.
- The Testing and Custom2 indicators display if the station is currently in a test.
- The TTA and TTB indicators represent the ME3's signal for which test type it is currently in. An indicator box also displays the test type as TType1 or TType2 etc.
- The Exhaust Chamber button opens the exhaust valve on that particular station. In order to effectively exhaust the chamber this button must be held for a minimum of 2 sec.
- The Part present indicator shows if the part present sensor for that station is triggered or not.
- The open chamber button actuates the solenoid to open the chamber cover. The indicator box to the buttons left will only turn yellow once the cylinder limit sensor is triggered.
- The close chamber button actuates the solenoid to close the chamber cover. The indicator box to the buttons left will only turn yellow once the cylinder limit sensor is triggered.

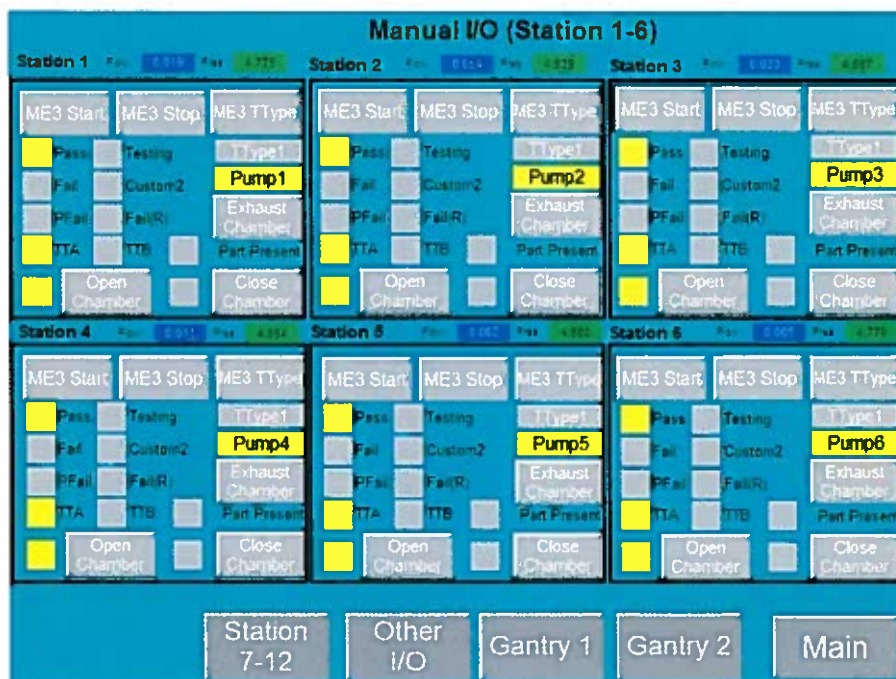


Figure 4-2 Manual Control for Stations 1-6

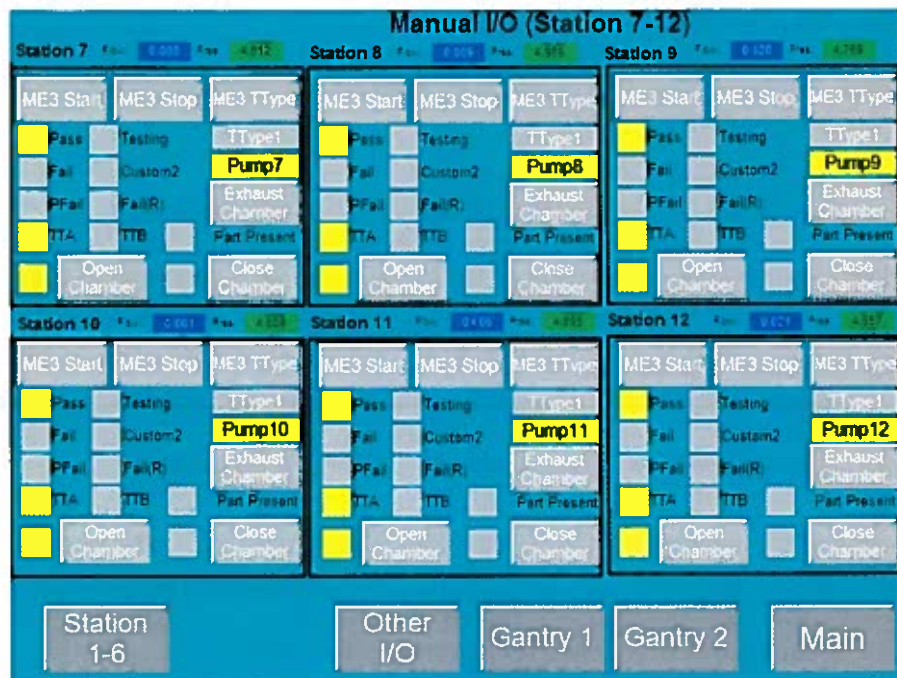


Figure 4-3 Manual Control for Stations 7-12

4.2.2 Manual I/O (Others)

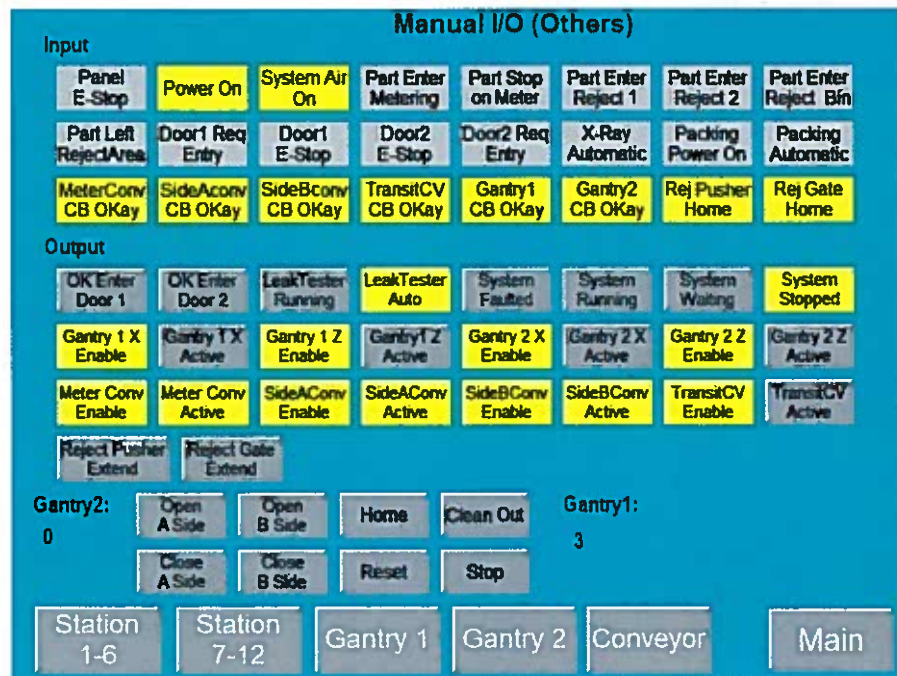


Figure 4-4 Manual Control for Other I/O

4.2.2.1 Manual Chamber Cleanout

The chambers in the machine can be manually cleaned out from the Manual I/O (other) screen. To perform the Manual Cleanout sequence:

- First make sure the chambers are all open.
 - If chambers are not open, open the respective side chambers
 - If the chamber is under vacuum, it has to be exhausted first prior to opening.
- Second, ensure there are no bags on the transit conveyor, underneath Gantry 2.
 - If there are bags on the transit conveyors, manually index the Transit conveyor from the Manual I/O (Conveyors) screen, Figure 4-7.
- Press the "Clean Out" button.
 - Gantry 2 will remove all bags from the chambers and place them on the transit conveyor.
 - The bags will then advance and get rejected by the machine

Note:

If the Air Cylinders for the chambers are not pressurized from both sides prior to an open/close operation, the chamber can slam open or shut.

Best practice is, for example if all side A chambers are closed.

- First Exhaust Side A.
- Then Press "Close A Side" this engages the close solenoid, to make sure there is air behind the cylinder
- Then Press "Open A Side" this engages the open solenoid, now both side of the cylinder is balanced
- Then press "Close A Side", this disengages the close solenoid, and the chamber will open smoothly

4.2.3 Manual I/O (Gantry 1)

Manual I/O (Gantry 1)

Input

Stop SYSTEM HOME HOME Z AXES
Reset HOME X AXES

Output Gantry1: 3

X Velocity: 20.0 Jog Gantry 1 X Positive Actual X Position -0.018 Vacuum Enable
X Acc: 20.0 Jog Gantry 1 X Negative Blow Off Enable

Z Velocity: 20.0 Jog Gantry Z Positive Actual Z Position 0.0000
Z Acc: 20.0 Jog Gantry Z Negative

Station 1-6 Station 7-12 Other I/O Gantry 2 Conveyors Main

Figure 4-5 Manual Control for Gantry 1

4.2.4 Manual I/O (Gantry 1)

Manual I/O (Gantry 2)

Input

Stop SYSTEM HOME HOME Z AXES
Reset HOME X AXES

Output Gantry 2: 3 Vacuum 1 Enable Blow Off 1 Enable
Vacuum 2 Enable Blow Off 2 Enable
Vacuum 3 Enable Blow Off 3 Enable
Vacuum 4 Enable Blow Off 4 Enable
Vacuum 5 Enable Blow Off 5 Enable
Vacuum 6 Enable Blow Off 6 Enable

X Velocity: 50.0 Jog Gantry X Positive Actual X Position 0.0000
X Acc: 50.0 Jog Gantry X Negative

Z Velocity: 25.0 Jog Gantry Z Positive Actual Z Position -0.001
Z Acc: 25.0 Jog Gantry Z Negative

Station 1-6 Station 7-12 Other I/O Gantry 1 Conveyors Main

Figure 4-6 Manual Control for Gantry 2

4.2.5 Manual I/O (Conveyors)

From This screen, the operator can manually move all the conveyors. If a manual clean out operation is being performed, the transit conveyors would have to be manually indexed. This ensures that bags are no placed over one another.

Input	Meter Conveyor	A Side Conveyor	B Side Conveyor	Transit Conveyor
Reset	Jog Pos	Jog Pos	Jog Pos	Jog Pos
Home	Jog Neg	Jog Neg	Jog Neg	Jog Neg
	Index Metering	Index A Side	Index B Side	Index Transit
Velocity:	100.0	100.0	100.0	100.0
Acc:	100.0	100.0	100.0	100.0

Station 1-6 Station 7-12 Other I/O Gantry 1 Gantry 2 Main

Figure 4-7 Manual Control for Conveyors

The manual screen is protected by maintenance level password levels.

Maintenance level allows operator to control and view all I/O individually. The operator can turn ON and OFF outputs or actuators while monitoring the input signals. This screen is useful for maintenance and hardware troubleshooting.

WARNING:

The manual indexing operation will not reject a failed bag.
If the Transit conveyor is manually indexed, any bags that exit the machine must be removed and leak tested again.

4.3 Part Setup

From this screen the operator can define the part number to be tested. A different part number has different test parameters associated with this number

The screenshot shows a blue background with the title "Part Setup" at the top. Below the title is a table with two columns: "Test Type" and "Part Numbers". The table contains four rows of data. The first row shows "TType1" and "OQPart1". The second row shows "TType2" and "OQPart2". The third row shows "TType3" and "OQPart2". The fourth row shows "TType4" and "OQPart2". In the bottom right corner of the blue area, there is a grey button labeled "System".

Test Type	Part Numbers
TType1	OQPart1
TType2	OQPart2
TType3	OQPart2
TType4	OQPart2

System

Figure 4-8 Part Setup

4.4 Request to Enter and Partial Power

The barrier guarding will prevent access inside the machine. The control power to the machine cannot be turned on if any of the two Guard doors are open. Therefore the Request to Enter (RTE) modules must be used to open the guard door and provide partial power to the machine.

To request entry to the machine:

- Turn the Door Master Key clockwise
 - This will turn off control power to the machine
- Turn the Manual Master Key counter clockwise
 - The door can now be open
- Remove the Manual Master Key and use it on the maintenance power module
 - Partial power is now available to the machine

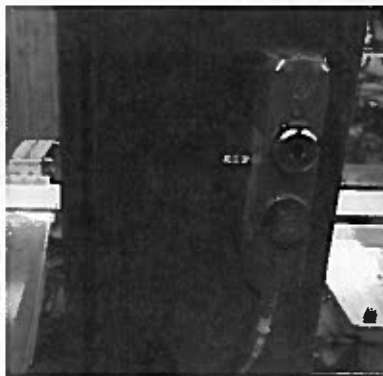


Figure 4-9 Partial Maintenance power module

Section 5 Communication

5.1 Communication between PLC and Real Time Automation Device (Catalog #: 490NBX)

The Model ME3 leak test instrument uses Ethernet TCP/IP. It cannot communicate with CompactLogix directly.

The 490NBX gateway seamlessly connects up to 10 Ethernet TCP/IP devices to a ControlLogix, CompactLogix, FlexLogix, MicroLogix, PLC5E, or SLC PLC.

The system has two 490NBX modules and each handles 6 ME3 instruments.

490NBX gateway is configured as shown on following figures.

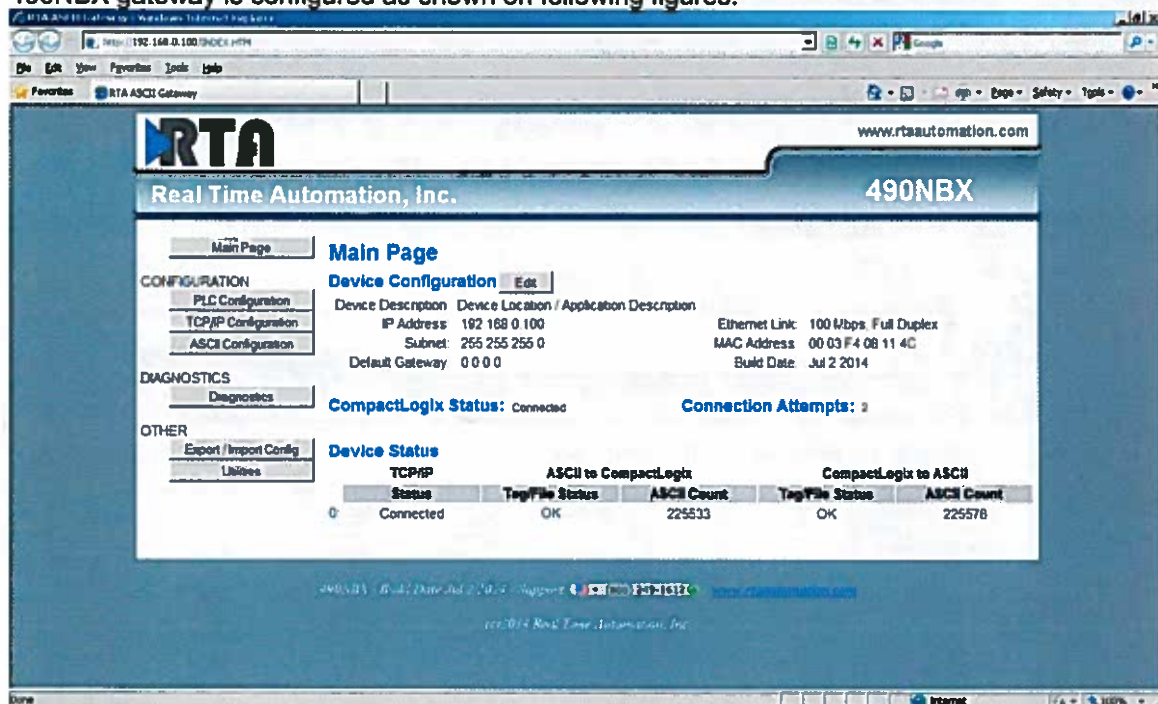
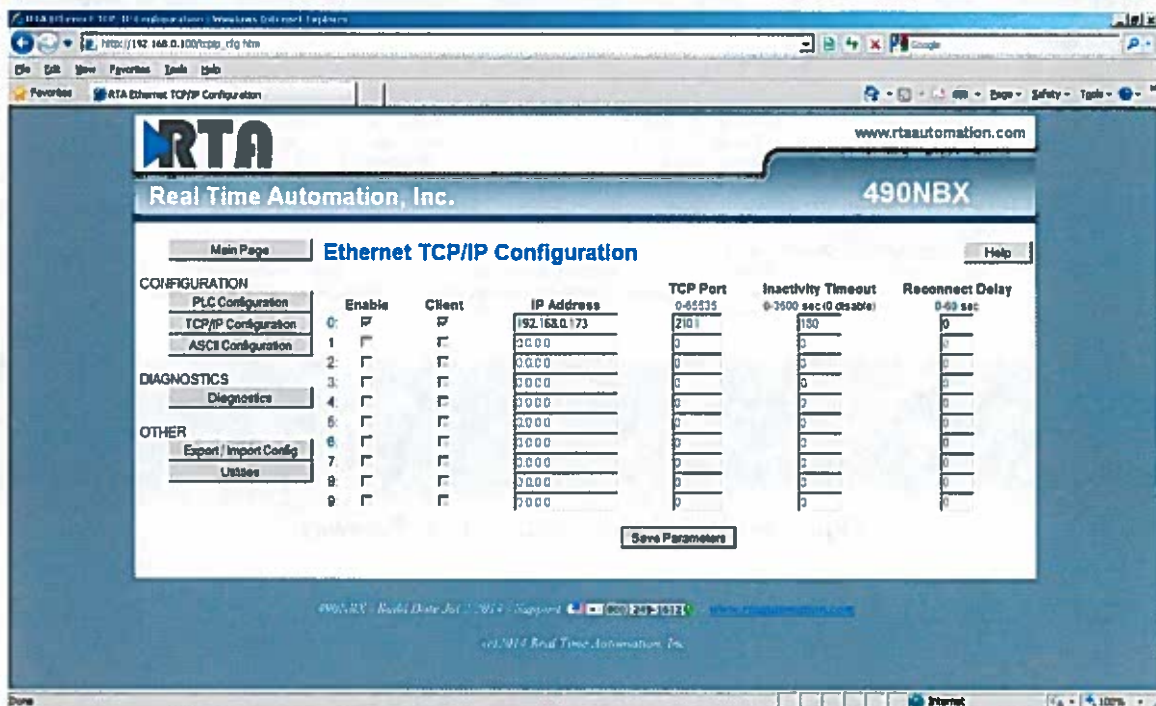
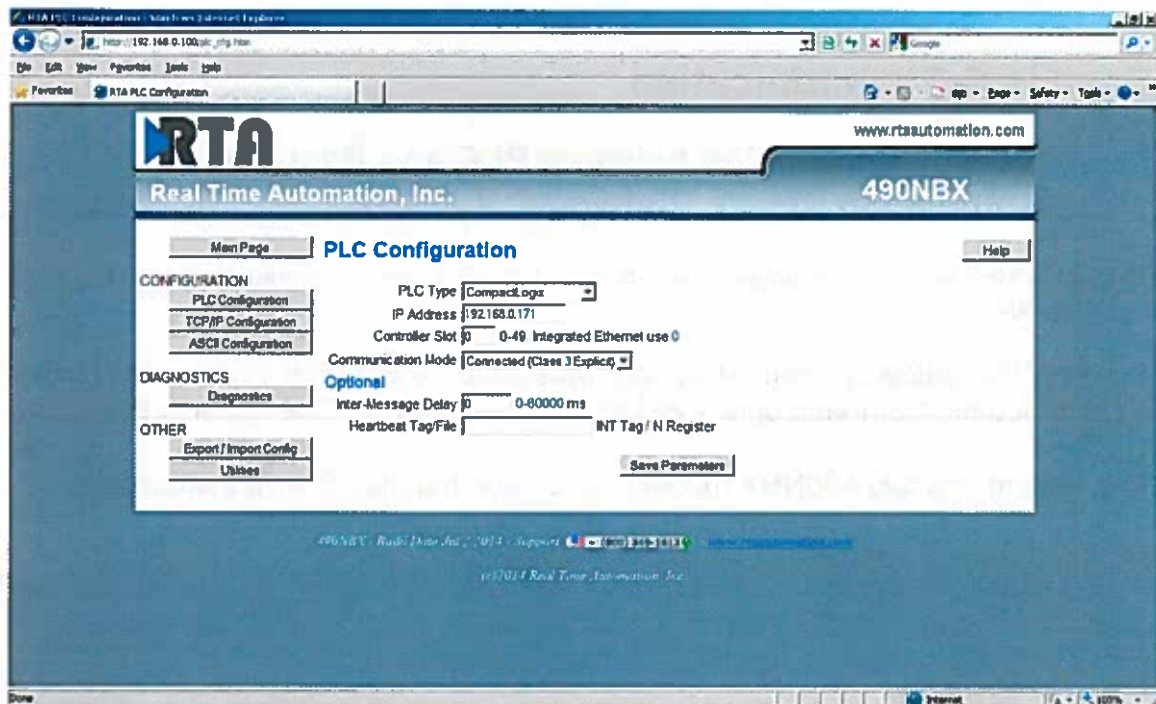


Figure 5-1 Main Page (ASCII to PLC Gateway)



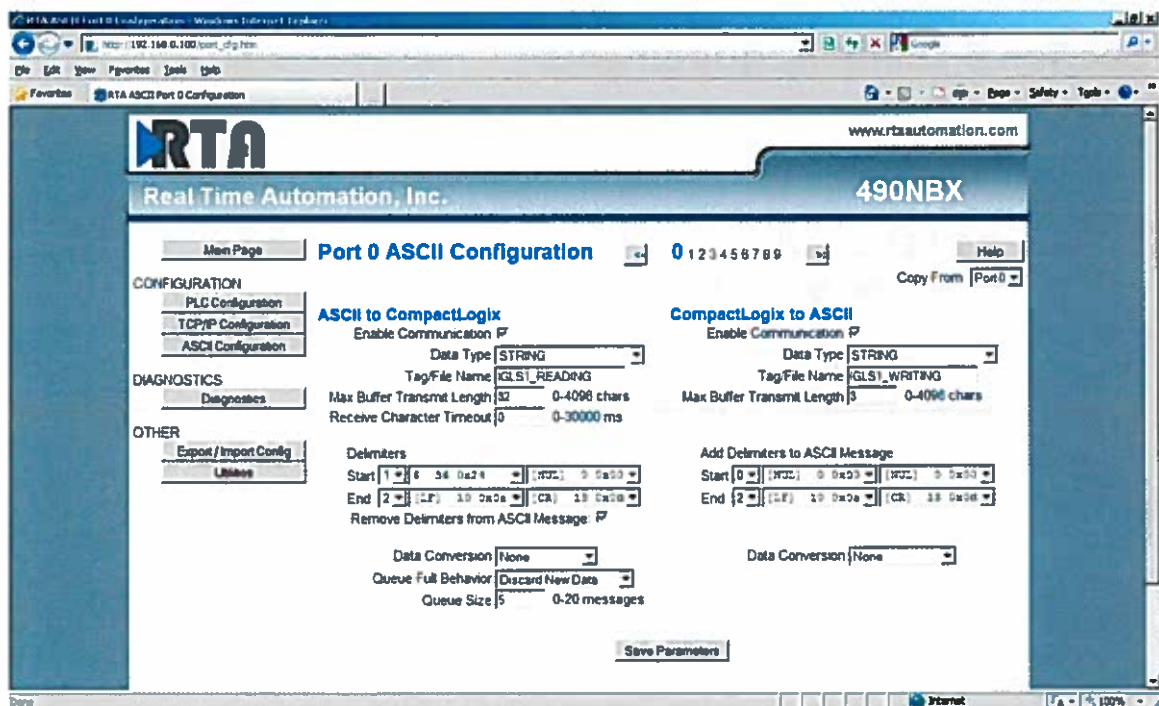


Figure 5-4 ASCII Configuration (ASCII to PLC Gateway)

5.2 Communication between LeakTek and Model ME3 Leak Test Instrument

LeakTek is windows based software designed for use with ATC's Micro-Flow sensors. It allows the user to change leak test parameters. It can communicate with Micro-flow sensors through Ethernet or the RS232 protocol (only one of the protocols can be used at a time). The communication protocol can be switched via a selection switch on the ME3 unit.

NOTE: A power cycle is required after switching communications mode

The Allen-Bradley PLC communicates with ME3 through Ethernet by 490NBX. The Ethernet of ME3 allows only **ONE** Ethernet connection. So, it cannot communicate with LeakTek and the Siemens PLC at the same time. LeakTek may be required in order to change the test parameters occasionally.

To connect LeakTek to the system in Ethernet mode, the following procedure should be followed:

1. Set the IP address of the PC to 192.168.1.240
2. Connect a PC using Ethernet cable to the Main Electrical Enclosure
3. Disconnect the Ethernet Cables for the tester in the Main Electrical Enclosure
4. Open LeakTek.
5. LeakTek will scan for and display the Station Number that can be connected to

Section 6 Utility Requirements

6.1 Utilities

6.1.1 Electrical

380v, 3 Ph, 50 Hz, 75 Amps

6.1.2 Pneumatic

Clean, dry air at 7-10 bar

Section 7 Maintenance and Adjustment

7.1 Test Pressure Adjustment

The nominal set point for the test pressure is 5 Torr. Acceptable set point for the test pressure is 4.8 ± 0.4 Torr. The test pressure must be individually adjusted for each test station. To adjust the test pressure:

- Take the Stainless Steel cover off next to test station that needs to be adjusted.
- Loosen the set screw (3/64" Allen wrench) that holds the knob of the needle valve secure
- Turn the needle valve clock wise to lower the pressure, and counter clockwise to raise it.
- One the desired level is reached, tighten the setscrew.



7.2 Preventive Maintenance

7.2.1 Vacuum Pump Level Check

Check vacuum pump oil level on vacuum pumps 1-12. If level is low refill with LVO 100 Leybond oil for vacuum pumps per instructions in Leybond D8B vacuum pump manual. Replace the oil as required. Replace filter element (Part# 18971) and oil in the Exhaust filter at the same time as the vacuum pump.

7.2.2 Chamber O-Ring Upkeep

Wipe down O-ring seals and chamber lid with lint free wipe for chambers 1-12. Replace the seals as required. Seal replacement schedule is determined by use and environment. ATC cannot accurately give seal life estimates. Avoid metal tools to pry out the seal to prevent scratching the seal surfaces. Ensure the seal is installed evenly and not overly stretched in one area. Use a light film of vacuum grease (DOW111 or equivalent) prior to installing a new seal.

7.2.3 Chamber Cavity Check

Inspect all chamber cavities for foreign materials and remove as necessary. For any contaminants wipe down with lint free wipe to remove. If necessary, use an alcohol based cleaner to remove residue.

7.2.4 Regulator Check

Check regulator pressures and adjust if necessary to achieve desired system pressures. The following is a table that defines the pressure ranges for various aspects of the machine.

System	Required Pressure Range
Nodes 1-4 Pressure	5.5-6 bar
Incoming air Supply	6.5-7 bar
Exhaust air Supply	0.5 bar

7.2.5 Suction Cup Inspection

Remove all suction cups and inspect each for defects. Any suction cup with a tear or rip should be replaced. Replace with Coeal 40mm vacuum cup MVS402.5SIT5C on Gantry 2 and 30mm vacuum cup MVS302.5SIT5 on Gantry 1.

7.2.6 Cylinder

Fest Cylinders are rated for up to 20 million cycle under ideal conditions. The cylinder can be serviced with the following Set of wearing parts ADN-40-P-A. Repair instructions can be obtained from Fest catalogue or the commercial literature provided by ATC.

7.2.7 Lubrication

For the proper operation of the machine and to prolong service life of the products, it is imperative that the Gantry 1 and Gantry 2 actuators are well lubricated. Refer to respective manufacture technical catalogue for calculating actual lubrication frequency and maintenance guidelines.

Lubrication	Axis	Application
Klüber ISOFLEX NBU 15	Gantry 1 Z-Axis ball screw Gantry 1 Z-Axis rod guide Gantry 2 Z-Axis ball screw Gantry 2 Z-Axis rod guide	Grease Gun
Klüber ISOFLEX TOPAS AK 50	Gantry 1 X Axis (OSPEBHD)	Grease Gun
Kyodo Yushi MULTEMP PS No.2	Gantry 2 Z-Axis Idler (404XR)	Apply by brush

7.3 Maintenance Schedule

The following maintenance schedules are recommendations only. Actual use of the machine will dictate if preventative maintenance (PM) intervals are adequate, excessive, or inadequate:

ITEM	INTERVAL	MAINTENANCE	ACTION
Vacuum Pumps 1-12	Every Shift	Check Level and color	Fill if required
Vacuum Pump Exhaust Filter	Bi-Annually	Oil accumulation	Change oil at the same time as the Vacuum pumps
Chamber O-Rings	Every Shift	Chamber seal upkeep	Replace if worn
Suction Cups	Daily	Check for Defects	Replace if damaged
Pneumatic inlet filters	Weekly	Water traps	Drain if required. Replace elements if worn/damaged

Part Exhaust Filter	Weekly	Filter Element	If parts fail blockage test more often than normal, replace filter element.
Bolt Inspection	Monthly	Check for loose fasteners	Loctite (various strengths)
Gantry Belts	Bi-Annually	Excessive Wear	Replace if worn
Gantry Lubrication	Monthly	Check for friction	Apply grease at grease insert points
Conveyor Belts	Bi-Annually	Excessive Wear	Replace if worn

Appendix A – Fault Codes and Troubleshooting

Table A Fault Codes and Troubleshooting			
Fault Code	Fault Description	Possible Cause(s)	Recommended Action
0	No Fault		
1	A SIDE INDEX CONVEYOR CB NOT OKAY	A Side Conveyor Drive does not have power	-Check if Circuit Breaker for A side conveyor has been tripped
2	TRANSIT CONVEYOR CB NOT OKAY	Transit Conveyor Drive does not have power	-Check if Circuit Breaker for Transit conveyor has been tripped
3	GANTRY 1 CB NOT OKAY	Gantry 1 Drive does not have power	-Check if Circuit Breaker for Gantry 1 has been tripped
4	GANTRY 2 CB NOT OKAY	Gantry 2 Drive does not have power	-Check if Circuit Breaker Gantry 2 has been tripped
5	B SIDE INDEX CONVEYOR CB NOT OKAY	B Side Conveyor Drive does not have power	-Check if Circuit Breaker for B side conveyor has been tripped
6	GANTRY 1 VACUUM SWITCH NOT ON	Vacuum sensor on gantry 1 has not been triggered	-Check to see if suction cup/s is still attached. -Check if part has been lost during pick and place -Check for defect in suction cup/s -Check if vacuum switch limit is set properly -Check that air supply to vacuum is connected and pressurized
7-12	GANTRY 2 VACUUM SWITCH #__(1-6) NOT ON	Specified Vacuum sensor on Gantry 2 has not been triggered	-Check to see if suction cup is still attached. -Check if part has been lost during pick and place -Check for defect in suction cup -Check if vacuum switch limit is set properly -Check that air supply to vacuum is connected and pressurized
13	METERING CONVEYOR CB NOT OKAY	Metering Conveyor Drive does not have power	-Check if Circuit Breaker for Metering conveyor has been tripped
14	CONSECUTIVE FAILURES	Chamber fails three consecutive tests	Inspect chamber seal for debris or defect
15	A SIDE LIDS CLOSING TIMEOUT	1 or more Cylinders on Side A have not triggered chamber closed sensor in allotted time	-Check for corresponding faults that identify specific chambers of issue (Faults 56-61)
16	B SIDE LIDS CLOSING TIMEOUT	1 or more Cylinders on Side B have not triggered chamber closed sensor in allotted time	-Check for corresponding faults that identify specific chambers of issue (Faults 62-67)

Table A Fault Codes and Troubleshooting

Fault Code	Fault Description	Possible Cause(s)	Recommended Action
17	REJECT GATE POSITION	The rejection gate position sensors are not properly triggered	<ul style="list-style-type: none"> -Check to see that the corresponding sensor is properly triggered for the current position of the rejection gate -Check cable connections to reject gate cylinder sensors -Check position of cylinder sensors and retighten -Replace faulty position sensors
18	REJECT PUSHER POSITION	The rejection Pusher position sensors are not properly triggered	<ul style="list-style-type: none"> -Check to see that the corresponding sensor is properly triggered for the current position of the rejection pusher -Check cable connections to reject pusher cylinder sensors -Check position of cylinder sensors and retighten -Replace faulty cylinder position sensors
19	FINAL COUNT MISMATCH	Sensors in the reject area	Check sensors in the reject area to see if they are working
20	A SIDE LIDS OPENING TIMEOUT	1 or more Cylinders on Side A have not triggered chamber open sensor in allotted time	-Check for corresponding faults that identify specific chambers of issue (Faults 68-73)
21	B SIDE LIDS OPENING TIMEOUT	1 or more Cylinders on Side B have not triggered chamber open sensor in allotted time	-Check for corresponding faults that identify specific chambers of issue (Faults 74-79)
22	A SIDE GANTRY 2 UNLOAD TIMEOUT	Gantry 2 has failed to Unload Side A in allotted time	<ul style="list-style-type: none"> -Check that Gantry 2 is positioned correctly over Side A -Check for corresponding faults that identify potential vacuum sensors of issue (Faults 7-12)
23	A SIDE GANTRY 2 LOAD TIMEOUT	Gantry 2 has failed to Load Side A in allotted time	<ul style="list-style-type: none"> -Check that Gantry 2 is positioned correctly over Side A -Check for corresponding faults that identify potential vacuum sensors of issue (Faults 7-12)
24	B SIDE GANTRY 2 UNLOAD TIMEOUT	Gantry 2 has failed to Unload Side B in allotted time	<ul style="list-style-type: none"> -Check that Gantry 2 is positioned correctly over Side B -Check for corresponding faults that identify potential vacuum sensors of issue (Faults 7-12)
25	B SIDE GANTRY 2 LOAD TIMEOUT	Gantry 2 has failed to Load Side B in allotted time	<ul style="list-style-type: none"> -Check that Gantry 2 is positioned correctly over Side B -Check for corresponding faults that identify potential vacuum sensors of issue (Faults 7-12)

Table A Fault Codes and Troubleshooting			
Fault Code	Fault Description	Possible Cause(s)	Recommended Action
26	A SIDE GANTRY 1 LOAD TIMEOUT	Gantry 1 has failed to Load from metering conveyor to Side A in allotted time	-Check for corresponding fault #6 which would identify a vacuum failure during pick and place -Check
27	B SIDE GANTRY 1 LOAD TIMEOUT	Gantry 1 has failed to Load from metering conveyor to Side B in allotted time	-Check for corresponding fault #6 which would identify a vacuum failure during pick and place -Check
28	PART REJECT FAILURE	A part has failed to properly reject	-Check for corresponding fault #116 to better define the issue - Compare Qty of parts in reject bin to parts Qty of rejected parts on HMI to verify part is present
29	LOW AIR PRESSURE	System pressure is not ON.	-Check system air supply; -Check regulator pressure.
30	A SIDE TEST START TIMEOUT	Side A has Failed to start test in the allotted time	Check the ME3 unit to make sure clamp output comes on at beginning of test.
31	B SIDE TEST START TIMEOUT	Side B has Failed to start test in the allotted time	Check the ME3 unit to make sure clamp output comes on at beginning of test.
32	A SIDE TEST COMPLETE TIMEOUT	Side A has Failed to complete the test in the allotted time	Check ME3 unit to make sure the clamp signal is working correctly, also the I/O board in remote panels
33	B SIDE TEST COMPLETE TIMEOUT	Side B has Failed to complete the test in the allotted time	Check ME3 unit to make sure the clamp signal is working correctly, also the I/O board in remote panels
34	GANTRY 1 X AXIS	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
35	GANTRY 1 Z AXIS	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
36	GANTRY 2 X AXIS	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
37	GANTRY 2 Z AXIS	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
38	METERING CONVEYOR	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
39	A SIDE INDEX CONVEYOR	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program

Table A Fault Codes and Troubleshooting

Fault Code	Fault Description	Possible Cause(s)	Recommended Action
40	B SIDE INDEX CONVEYOR	Circuit Breaker, Drives disables from PLC	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
41	TRANSIT CONVEYOR	Circuit Breaker, Drives disables from PLC. Drive faulted	Check Circuit Breaker, Make sure drives are all green lights, check PLC program
42	CONTROL POWER	E-Stop, door interlock circuit breaker	Check to make sure the E-Stops, Doors Closed, Circuit Breaker for 24vdc supply is not tripped
43	E-STOP	Power on input is not ON.	Check E-Stop
44-55	PART NOT PRESENT IN CHAMBER ____ (1-12)	Part Presence Sensor is not activated	<ul style="list-style-type: none"> -Check that part is present within chamber -Check that sensor cable is connected. -Check for proper sensor orientation and calibration to sense part -Recalibrate or replace sensor as necessary
56-67	CHAMBER ____ (1-12) CLOSE TIMEOUT	Chamber Close switch of corresponding chamber is not ON within a period of time which can be set at System Screen.	<ul style="list-style-type: none"> -Check that the part is properly oriented in the chamber -Check for foreign objects preventing the chamber from closing -Check chamber cylinder; -Check chamber close position switch.
68-79	CHAMBER ____ (1-12) OPEN TIMEOUT	Chamber Open switch of corresponding chamber is not ON within a period of time which can be set at System Screen.	<ul style="list-style-type: none"> -Check chamber cylinder; -Check chamber open position switch is properly triggered -Check that chamber has been properly vented using the manual screen.
80-91	CHAMBER ____ (1-12) START TIMEOUT	Unable to confirm that the test started	<ul style="list-style-type: none"> -Check Model ME3 remote I/O wiring to PLC; -Check Model ME3 configuration.
92-103	CHAMBER ____ (1-12) TEST TIMEOUT	Test did not finish within required time for specified Tester	<ul style="list-style-type: none"> -Check Model ME3 remote I/O wiring to PLC; -Check Model ME3 configuration; -Check System screen timeout value for pressure leak test.
104-115	CHAMBER ____ (1-12) REDUNDENT FAIL ALARM	25 pin connector may came loose	Check 25 pin connector on control board in corresponding remote panel

Table A Fault Codes and Troubleshooting			
Fault Code	Fault Description	Possible Cause(s)	Recommended Action
116	REJECT SHUTE BLOCKED	Reject Chute sensor did not see part	<ul style="list-style-type: none"> -Check to see if part is caught on reject chute or still on the belt -Compare Qty of parts in reject bin to parts Qty of rejected parts on HMI to verify part is present -Check reject sensor connector -Check reject sensor for proper orientation and calibration to sense part on reject chute
117-120	NODE ____ (1-4) NOT COMMUNICATING	Specified Node has lost communication to the PLC	<ul style="list-style-type: none"> -Check that node has power -Check for tripped breaker -Check communication cables to specified node